amended to more distinctly claim Applicants' invention. Claims 14, 21 and 26 were amended to address the Examiner's non-art based rejections. Claim 16 was amended for clarity and to address the Examiner's objection. The amendments to the claims are supported by the originally filed disclosure.

The drawing figures were objected to and correction required. Amended drawing figures are submitted herewith to address the drawing objections.

Included herewith is a marked-up version of the amendments to the subject application by the current amendment. The marked-up versions are found on the pages captioned or entitled "Details of Amendments" that follow the signature page of the within Response.

35 U.S.C. §112, SECOND PARAGRAPH REJECTIONS

Claims 14, 15, 21 and 26 stand rejected under 35 U.S.C. §112 on the grounds that there are antecedent basis, indefiniteness and/or vagueness concerns with the identified claims. Because, specific comments were not provided regarding the language of claim 15, it is presumed that this claim stands rejected because of the dependency from a rejected claim with an identified concern.

As provided above, claims 14, 21 and 26 were amended to address the non-art concerns specifically identified by the Examiner. Applicants also further direct the Examiner's attention to the discussion at pages 44-46 (in particular page 44, line 3 through page 46, line 19) as well as Table 1 (pg. 47) and FIGS. 12-13. From this discussion, it can be seen that positive application is application of a voltage to a positive side in voltage application to pixel electrodes with a reference voltage for example of 0V and negative application is application of a voltage to a negative side in

voltage application to pixel electrodes with a reference voltage for example of 0V. Applicant believes that the areas of rejection have been identified and addressed in the foregoing amendment.

Accordingly, it is respectfully submitted that claims 14, 15, 21 and 26 satisfy the requirements of 35 U.S.C. §112 and, as such, are in a condition for allowance.

35 U.S.C. §102 REJECTIONS

Claims 1, 14-15, 18, 23, 28-30, 32, 34, and 36-37 stand rejected under 35 U.S.C. §102 as being anticipated the cited references for the reasons provided on pages 4-8 of the above-referenced Office Action. Because claims were amended in the foregoing amendment, the following discussion refers to the language of the amended claim(s). However, only those amended features specifically relied on in the following discussion shall be considered as being made to overcome the prior art reference. The following addresses the specific rejections provided in the above-referenced Office Action.

CLAIMS 1, 14-15, 18 & 23

Claims 1, 14-15, 18 and 23 stand rejected as being anticipated by Yanagi, et al. [USP 6,359,607; "Yanagi"] for the reasons provided on pages 4-6 of the above referenced Office Action. Applicants respectfully traverse.

CLAIMS 1, 18 & 23

Applicants claim, claim 1, a method for driving an image display device which includes a plurality of pixel electrodes which are formed on a substrate, pixel switching elements which are

individually connected to the pixel electrodes, a plurality of signal lines for applying a data signal according to a display image to the pixel electrodes, and a common electrode for applying a common potential to pixels. The method controls a voltage applied to the pixel electrodes in a conduction period of the pixel switching elements according to a pulse width supplied to the signal lines. Also, in the conduction period of the pixel switching elements, the voltage applied to the pixel electrodes is less than a voltage supplied to the signal lines, and the voltage applied to the signal lines is determined to be higher than a desired charging voltage required for the pixel electrodes so that the voltage applied to the pixel electrodes becomes a desired value.

Yanagi includes such a description that a level shift ΔVd caused by parasitic capacitances Cgd occurring to the pixel potential Vd at a fall of the scanning voltage Vgh causes a problem such as flickering (see column 2, line 50-65 thereof). This necessarily reveals that, Figure 12 of Yanagi only teaches or discloses that, when a transistor is used as the switching element, the pixel potential is drawn toward the negative side (level shift) by parasitic capacitances between a gate and a drain when the scanning line is switched from ON to OFF. The reference does not teach nor disclose a methodology in which the voltage applied to the pixel electrode is lower than the voltage supplied to the signal line, during the conduction period of the switching element.

It is respectfully submitted that the foregoing remarks distinguishing claim 1 from the cited reference also applies to distinguish each of claims 18 and 23 from the cited reference.

CLAIMS 14-15

Applicants claim, claim 14, a method for driving an image display device, said method displaying tones by modulating a pulse width of a two-value voltage supplied to signal lines. Also, a polarity of a voltage applied to pixels is changed for each scanning line, and in voltage application to pixel electrodes with a reference voltage 0V, an amplitude of scanning lines is varied between positive application for applying a voltage to a positive side and negative application for applying a voltage to a negative side.

Yanagi only teaches or discloses that the scanning pulse includes an intermediate ON region (linear region) between a threshold level VT of the TFT and the level Vgh (see column 3, lines 38-49 thereof). Further. Figure 13 and the description thereof in Yanagi provides no teaching or disclosure regarding the polarity at the application. Thus, and in contrast to Figures 39-41 of the subject application, Yanagi does not teach nor disclose that the amplitude of the signal line varies per vertical period, adopting to the alternating polarity of the applied voltage to the pixel per scanning line, in other words, the amplitudes of the signal lines are different between the positive application and the negative application. It thus necessarily follows that Yanagi cannot disclose or teach the methodology as claimed by Applicants.

It is respectfully submitted that claims 1, 14-15, 18 and 23 are patentable over the cited reference for the foregoing reasons.

CLAIMS 28-30, 34, 36 & 37

Claims 28-30, 34, 36 and 37 stand rejected as being anticipated by Yoshida et al. [USP 6,359,607; "Yoshida"] for the reasons provided on pages 6-8 of the above referenced Office Action. Applicants respectfully traverse.

CLAIMS 28-30 & 34

As indicated above, claim 28 was amended in the foregoing amendment so as to include the limitations of canceled claim 35, which claim depends from claim 28 there being no intervening claims. Also, the above-referenced Office Action indicates that claim 35 contains allowable subject matter and that this claim would be allowable if appropriately re-written in independent form. In view of the foregoing amendment to the base claim, claim 28, to include the limitations of claim 35, claim 28 is considered to be in allowable form.

The foregoing remarks also apply to distinguish each of claims 29-30 and 34.

CLAIM 36

As indicated above, claim 36 was amended in the foregoing amendment so as to include the limitations of canceled claim 35. Also, the above-referenced Office Action indicates that claim 35 contains allowable subject matter. In view of the foregoing amendment to claim 36, to include the limitations of claim 35, claim 36 is considered to be in allowable form. Applicants also submit that the cited reference carries out temperature compensation of the signal voltage. In contrast, the present invention caries out the temperature compensation of the scanning signal.

CLAIM 37

Applicants claim, claim 37, a driving method of an active matrix-driven image display device having an image display panel for displaying an image by switching by a plurality of active elements and carrying out step up voltage of a signal for driving the active elements so as to supply the signal to the image display panel. Further, and before stepping up, a voltage of a signal for driving the active elements is varied according to temperature change of the image display panel, so as to carry out temperature compensation of the active elements.

Yoshida, from the column 13 line 36 to the column 14 line 13-20, discloses a liquid crystal apparatus, which is shown in Figure 8, carried out temperature compensation with respect to the signal voltage immediately before being applied to an active matrix panel, with voltage decrement correction as a first correction factor, and also uses a temperature signal 87 sent from a temperature sensor 86 as a second correction factor. This apparatus differs from the display device shown in the specification (see page 115 line 19 to page 118 line 7 and in claim 35 of the subject application) in which the power supply voltage is subjected to temperature compensation before being stepped up and the voltage after the temperature compensation is then stepped up and supplied to the panel.

CLAIM 32

Claim 32 stands rejected as being anticipated by Johnson et al. [USP 6,329,976] for the reasons provided on page 8 of the above referenced Office Action. Applicants respectfully traverse.

Claim 32, depends from claim 28. As indicated above, claim 28 was amended so as to include the limitations of claim 35 and as such claim 28 is considered to be in allowable form. Thus, and at least because of the dependency from an allowable claim, claim 32 is considered to be allowable. Applicants also submit that the cited reference carries out temperature compensation of the signal voltage. In contrast, the present invention caries out the temperature compensation of the scanning signal.

It is respectfully submitted that claim 33 is patentable over the cited reference(s) for the foregoing reasons.

It is respectfully submitted that for the foregoing reasons, claims 1, 14-15, 18, 23, 28-30, 32, 34, and 36-37 are patentable over any of the cited reference(s) and thus satisfy the requirements of 35 U.S.C. §102. As such, these claims, including the claims dependent therefrom are allowable.

35 U.S.C. §103 REJECTIONS

Claims 31 and 33 stand rejected under 35 U.S.C. § 103 as being unpatenable over the cited references for the reasons provided on pages 9-10 of the above-referenced Office Action. Because claims were amended in the foregoing amendment, the following discussion refers to the language of the amended claim(s). However, only those amended features specifically relied on in the following discussion shall be considered as being made to overcome the prior art reference. The following addresses the specific rejections provided in the above-referenced Office Action.

CLAIM 31

Claim 31 stands rejected as being unpatentable over Yoshida in view of Okamoto [USP 6,096,184] for the reasons provided on page 9 of the above referenced Office Action. Applicants respectfully traverse.

Claim 31, depends from claim 28. As indicated above, claim 28 was amended so as to include the limitations of claim 35 and as such claim 28 is considered to be in allowable form. Thus, and at least because of the dependency from an allowable claim, claim 31 is considered to be allowable.

It is respectfully submitted that claim 31 is patentable over the cited reference(s) for the foregoing reasons.

CLAIM 33

Claim 33 stands rejected as being unpatentable over Yoshida in view of Wood et al. [USP 5,926,162] for the reasons provided on pages 9-10 of the above referenced Office Action. Applicants respectfully traverse.

Claim 33, depends from claim 28. As indicated above, claim 28 was amended so as to include the limitations of claim 35 and as such claim 28 is considered to be in allowable form. Thus, and at least because of the dependency from an allowable claim, claim 33 is considered to be allowable. Applicants also submit that the foregoing reference carries out temperature compensation of the signal voltage. In contrast, the present invention caries out the temperature compensation of the common signal.

It is respectfully submitted that claim 33 is patentable over the cited reference(s) for the foregoing reasons.

It is respectfully submitted that for the foregoing reasons, claims 31 and 33 are patentable over the cited reference(s) and thus, satisfy the requirements of 35 U.S.C. §103. As such, these claims, including the claims dependent therefrom are allowable.

CLAIM 16

Claim 16 was objected to because of an identified informality.

As indicated above, claim 16 was amended for clarity to address the Examiner's objection.

Thus, it is respectfully submitted that as-amended claim 16 is acceptable and satisfies applicable Patent Office Rules.

CLAIMS 21, 26

The above-referenced Office Action provides that claims 21 and 26 would be allowable if they were amended to overcome the rejections under 35 U.S.C. §112, second paragraph. As provided above, claims 21 and 26 were amended to resolve the Examiner's §112 rejections. Accordingly, claims 21 and 26 are considered to be in allowable form.

CLAIMS 2-6 & 35

In the above-referenced Office Action, claims 2-6 and 35 were objected to as being dependent upon a rejected base claim. It also was provided in the above-referenced Office Action,

however, that these claims would be allowable if rewritten in independent form to include all the limitations of the base claim and any intervening claim(s).

Claims 2-6 were re-written in the foregoing amendment so as to be in independent form and to include all the limitations of the base claim there being no intervening claim(s). Accordingly, claims 2-6 are considered to be in allowable form.

As to claim 35 this claim was not re-written in independent form as suggested by the Examiner. Instead and as indicated above, the limitations of claim 35 were added to the base claim, claim 28.

DRAWING OBJECTIONS

The Examiner objected to the drawing figures for the reasons set forth on page 2 of the above referenced Office Action and requested correction of same. As indicated above, amended drawing figures are being submitted herewith to address the Examiner's objections. Reference shall be made to page 61, line 24 to page 63, line 13, page 64, lines 5-22 and page 81, lines 10-14 for support for these amendments.

As such the drawing figures, as amended, are considered acceptable.

It is respectfully submitted that the subject application is in a condition for allowance. Early and favorable action is requested.

Because the total number of claims and/or the total number of independent claims in the subject application post amendment now exceed the highest number previously paid for, a check is

enclosed herewith for the required additional fees. However, if for any reason a fee is required, a fee paid is inadequate or credit is owed for any excess fee paid, the Commissioner is hereby authorized and requested to charge Deposit Account No. **04-1105**.

Respectfully submitted,
EDWARDS & ANGELL, LLP
DBRC Intellectual Property Practice Group

Date: April 15, 2003

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DETAILS OF AMENDMENTS

Please amend the subject application as follows:

IN THE CLAIMS

Cancel claim 35 without prejudice.

Amend claim(s) 1-6, 14, 16, 18, 21, 23, 26, 28, 36 and 37 to read as follows:

1. (AMENDED) A method for driving an image display device which includes a plurality of pixel electrodes which are formed on a substrate, pixel switching elements which are individually connected to the pixel electrodes, a plurality of signal lines for applying a data signal according to a display image to the pixel electrodes, and a common electrode for applying a common potential to pixels, said method controlling a voltage applied to the pixel electrodes in a conduction period of the pixel switching elements according to a pulse width supplied to the signal lines,

wherein, in the conduction period of the pixel switching elements, the voltage applied to the pixel electrodes is less than a voltage supplied to the signal lines, and the voltage applied to the signal lines is determined to be higher than a desired charging voltage required for the pixel electrodes so that the voltage applied to the pixel electrodes becomes a desired value.

2. (AMENDED) ~~The method as set forth in claim 1,~~ A method for driving an image display device which includes a plurality of pixel electrodes which are formed on a substrate, pixel switching elements which are individually connected to the pixel electrodes, a plurality of signal lines for applying a data signal according to a display image to the pixel electrodes, and a common

electrode for applying a common potential to pixels, said method controlling a voltage applied to the pixel electrodes in a conduction period of the pixel switching elements according to a pulse width supplied to the signal lines,

wherein the voltage applied to the pixel electrodes is less than a voltage supplied to the signal lines, and

wherein a proportion of a maximum value of the voltage applied to the pixel electrodes with respect to the voltage supplied to the signal lines becomes different depending on a polarity of the voltage applied to the pixel electrodes.

3. (AMENDED) ~~The method as set forth in claim 1,~~ A method for driving an image display device which includes a plurality of pixel electrodes which are formed on a substrate, pixel switching elements which are individually connected to the pixel electrodes, a plurality of signal lines for applying a data signal according to a display image to the pixel electrodes, and a common electrode for applying a common potential to pixels, said method controlling a voltage applied to the pixel electrodes in a conduction period of the pixel switching elements according to a pulse width supplied to the signal lines,

wherein the voltage applied to the pixel electrodes is less than a voltage supplied to the signal lines, and

wherein the pulse width of a supplied voltage to the signal lines in the conduction period of the pixel switching elements becomes different depending on a polarity of the voltage applied to the pixel electrodes, even when displaying the same tone.

4. (AMENDED) ~~The method as set forth in claim 1,~~ A method for driving an image display device which includes a plurality of pixel electrodes which are formed on a substrate, pixel switching elements which are individually connected to the pixel electrodes, a plurality of signal lines for applying a data signal according to a display image to the pixel electrodes, and a common electrode for applying a common potential to pixels, said method controlling a voltage applied to the pixel electrodes in a conduction period of the pixel switching elements according to a pulse width supplied to the signal lines,

wherein the voltage applied to the pixel electrodes is less than a voltage supplied to the signal lines, and

wherein an allocated time for a single scanning line is different for each polarity of the voltage applied to the pixel electrodes.

5. (AMENDED) ~~The method as set forth in claim 1,~~ A method for driving an image display device which includes a plurality of pixel electrodes which are formed on a substrate, pixel switching elements which are individually connected to the pixel electrodes, a plurality of signal lines for applying a data signal according to a display image to the pixel electrodes, and a common electrode for applying a common potential to pixels, said method controlling a voltage applied to the pixel electrodes in a conduction period of the pixel switching elements according to a pulse width supplied to the signal lines,

wherein the voltage applied to the pixel electrodes is less than a voltage supplied to the signal lines, and

wherein, with respect to an image display device having the common electrode for applying a common potential to the pixels and having a plurality of scanning lines for driving the pixel switching elements, liquid crystal is displaced according to a potential difference between the common electrode and the pixel electrodes so as to carry out display, and an amplitude of a voltage supplied to the signal lines is equal to an amplitude of a voltage supplied to the common electrode.

6. (AMENDED) ~~The method as set forth in claim 1,~~ A method for driving an image display device which includes a plurality of pixel electrodes which are formed on a substrate, pixel switching elements which are individually connected to the pixel electrodes, a plurality of signal lines for applying a data signal according to a display image to the pixel electrodes, and a common electrode for applying a common potential to pixels, said method controlling a voltage applied to the pixel electrodes in a conduction period of the pixel switching elements according to a pulse width supplied to the signal lines,

wherein the voltage applied to the pixel electrodes is less than a voltage supplied to the signal lines, and

wherein a maximum value of an amplitude of the voltage applied to the pixel electrodes is in a range of not less than 80 percent and not more than 98 percent of an amplitude of a voltage supplied to the signal lines.

14. (AMENDED) A method for driving an image display device, said method displaying tones by modulating a pulse width of a two-value voltage supplied to signal lines,

wherein a polarity of a voltage applied to pixels is changed for each scanning line, and in voltage application to pixel electrodes with a reference voltage 0V, an amplitude of scanning lines is varied between positive application for applying a voltage to a positive side and negative application for applying a voltage to a negative side.

16. (AMENDED) A method for driving an image display device, said method displaying tones by modulating a pulse width of a two-value voltage supplied to signal lines,

wherein a resistance of a transistor which switches ON or OFF signal application from the signal lines to pixels is increased with time from a beginning to an end of an application time of a single pixel, where the application time of the single pixel is 1 horizontal period.

18. (AMENDED) A driving device of an image display device which includes a plurality of pixel electrodes which are formed on a substrate, pixel switching elements which are individually connected to the pixel electrodes, a plurality of signal lines for applying a data signal according to a display image to the pixel electrodes, and a common electrode for applying a common potential to pixels,

said driving device applying a voltage between a potential of the signal lines and a potential of the common electrode when a potential of scanning lines is ON, and displaying tones by modulating a pulse width of a two-value voltage supplied to the signal lines,

wherein said driving device includes a signal line driving section for supplying a voltage, not less than a voltage supplied to the pixel electrodes, to the signal lines so that the voltage applied to the pixel electrodes becomes a voltage taking into account change of an optimum counter voltage according to a display tone.

21. (AMENDED) A driving device of an image display device which includes a plurality of pixel electrodes which are formed on a substrate, pixel switching elements which are individually connected to the pixel electrodes, a plurality of signal lines for applying a data signal according to a display image to the pixel electrodes, and a common electrode for applying a common potential to pixels,

said driving device applying a voltage between a potential of the signal lines and a potential of the common electrode when a potential of scanning lines is ON, and displaying tones by modulating a pulse width of a two-value voltage supplied to the signal lines,

wherein said driving device includes a scanning line driving section for varying an amplitude of a voltage supplied to the scanning lines between positive application for applying a voltage to a positive side and negative application for applying a voltage to a negative side.

23. (AMENDED) An image display device which includes a plurality of pixel electrodes which are formed on a substrate, pixel switching elements which are individually connected to the pixel electrodes, a plurality of signal lines for applying a data signal according to a display image to the pixel electrodes, and a common electrode for applying a common potential to pixels,

said image display device applying a voltage between a potential of the signal lines and a potential of the common electrode when a potential of scanning lines is ON, and displaying tones by modulating a pulse width of a two-value voltage supplied to the signal lines,

wherein said image display device includes a signal line driving section for supplying a voltage, not less than a voltage applied to the pixel electrodes, to the signal lines so that the voltage applied to the pixel electrodes becomes a voltage taking into account change of an optimum counter voltage according to a display tone.

26. (AMENDED) An image display device which includes a plurality of pixel electrodes which are formed on a substrate, pixel switching elements which are individually connected to the pixel electrodes, a plurality of signal lines for applying a data signal according to a display image to the pixel electrodes, and a common electrode for applying a common potential to pixels,

said image display device applying a voltage between a potential of the signal lines and a potential of the common electrode when a potential of scanning lines is ON, and displaying tones by modulating a pulse width of a two-value voltage supplied to the signal lines,

wherein said image display device includes a scanning line driving section for varying an amplitude of a voltage supplied to the scanning lines between positive application for applying a voltage to a positive side and negative application for applying a voltage to a negative side.

28. (AMENDED) An activematrix-driven image display device including an image display panel for displaying an image by switching by a plurality of active elements, comprising:

a voltage varying circuit for varying a voltage of a signal for driving the active elements according to temperature change of the image display panel, so as to carry out temperature compensation of the active elements, and ;

a step-up circuit for stepping up a signal voltage for driving the active elements,

said signal voltage for driving the active elements being stepped up by the step-up circuit after being varied by the voltage varying circuit.

36. (AMENDED) A driving device of an activematrix-driven image display device having an image display panel for displaying an image by switching by a plurality of active elements, said driving device comprising:

a voltage varying circuit for varying a voltage of a signal for driving the active elements according to temperature change of the image display panel, so as to carry out temperature compensation of the active elements, and ;

a step-up circuit for stepping up a signal voltage for driving the active elements,

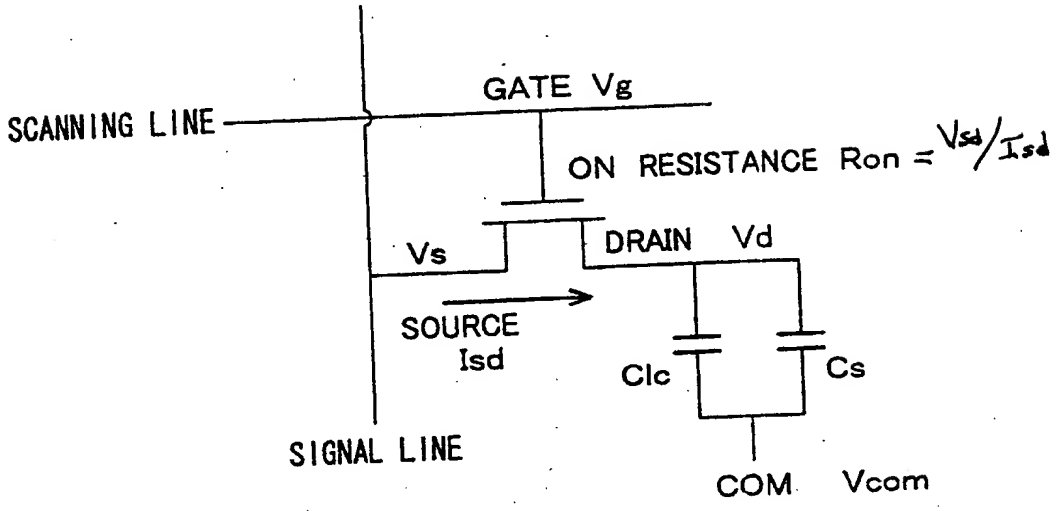
said signal voltage for driving the active elements being stepped up by the step-up circuit after being varied by the voltage varying circuit.

37. (AMENDED) A driving method of an activematrix-driven image display device having an image display panel for displaying an image by switching by a plurality of active elements and carrying out step up voltage of a signal for driving the active elements so as to supply the signal to the image display panel,

wherein a voltage of a signal for driving the active elements is varied before the step up according to temperature change of the image display panel, so as to carry out temperature compensation of the active elements.

Approved by examiner
8/7/03

FIG. 18



$$I_{sd} = W/L \times \mu \times Cox \times ((V_{gs} - V_{th}) \times V_{sd} - 1/2 \times V_{sd2})$$

$$V_{sd} = V_d - V_s,\ V_{gs} = V_s - V_g,\ V_{gd} = V_d - V_g$$

FIG. 19

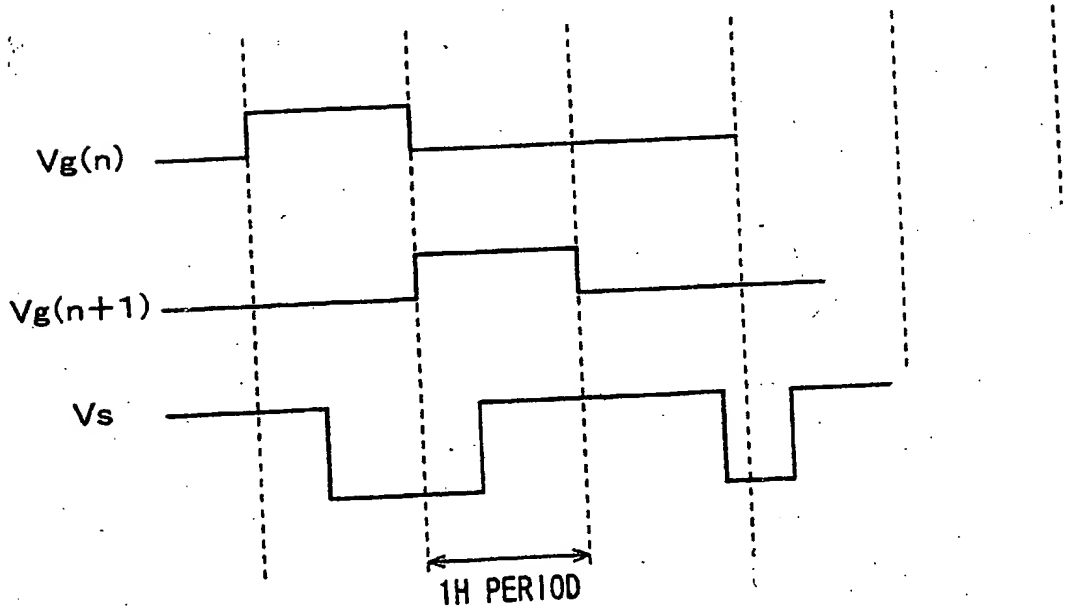


FIG. 32

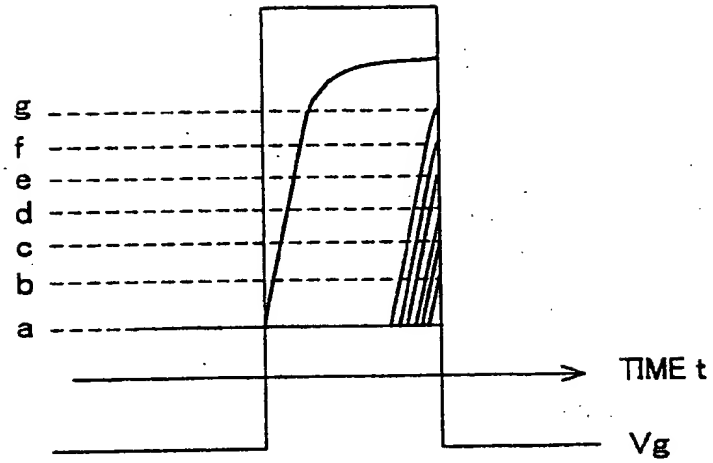


FIG. 33

Vg becomes large → resistance of transistor becomes small

Vg becomes small → resistance of transistor becomes large

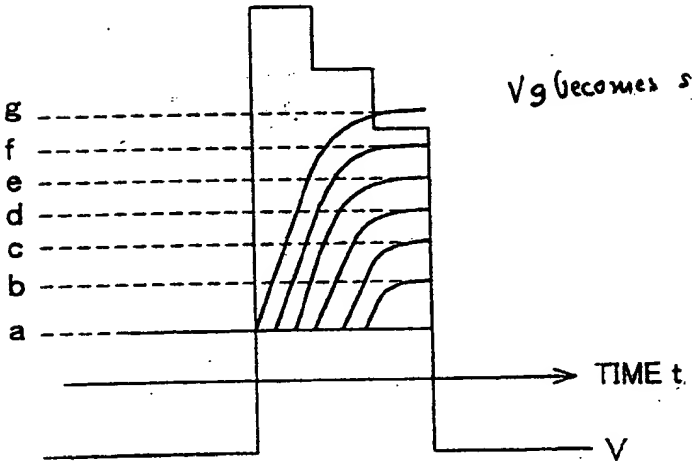
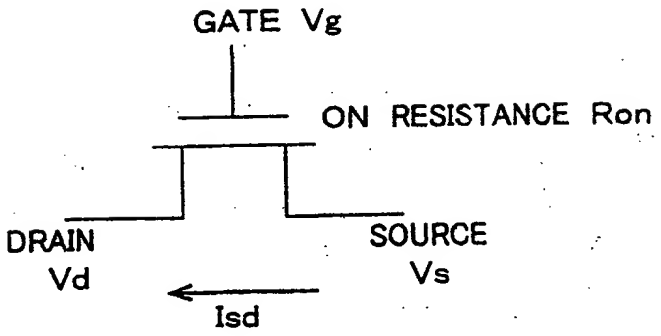


FIG. 36



$$Ron = Vsd/Isd$$

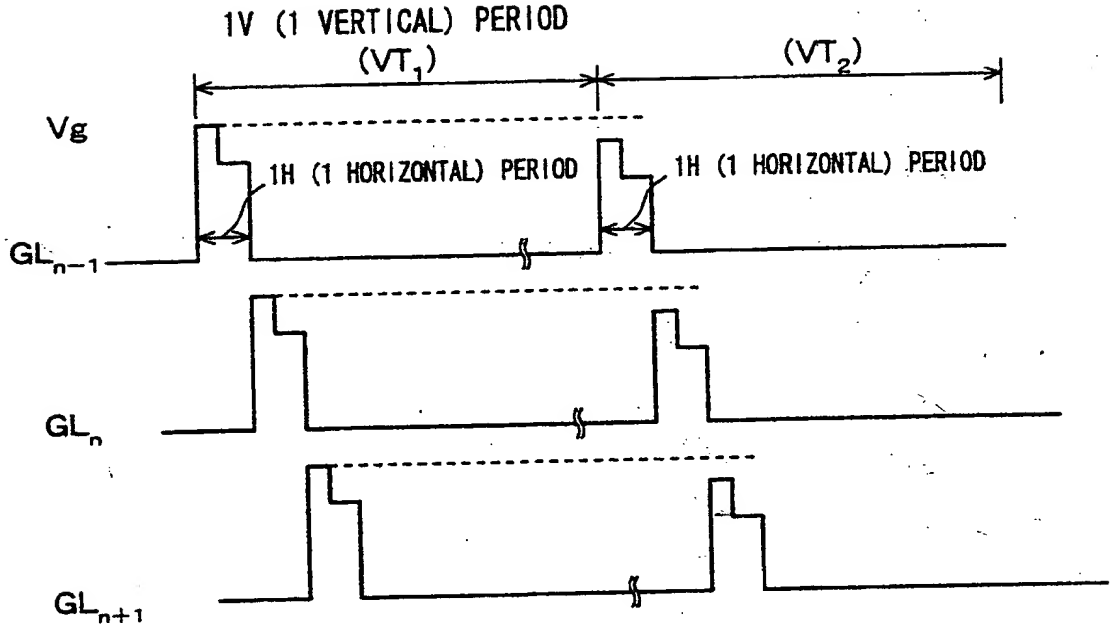
$$Isd = W/L \times \mu \times Cox \times ((Vgs - Vth) \times Vsd - \gamma_L \times Vsd^2)$$

$$Vsd = Vd - Vs$$

$$Vgs = Vs - Vg$$

$$Vgd = Vd - Vg$$

FIG. 41



Vg becomes large → resistance of transistor becomes small

Vg becomes small → resistance of transistor becomes large